

# OSRAM KW DMLQ32.SB

## Datasheet

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SYNIOS® P2720

# KW DMLQ32.SB

This compact LED device is part of the SYNIOS P2720 family. Given the scalability of this product family, it provides full performance and flexibility with just one footprint. The KW DMLQ32.SB product is meant to provide superior light quality in 1/2 mm<sup>2</sup> chip size class.



## Applications

- Display Backlighting
- Static Signaling

## Features

- Package: SMD epoxy package
- Chip technology: UX:3
- Typ. Radiation: 120° (Lambertian emitter)
- Color: C<sub>x</sub> = 0.27, C<sub>y</sub> = 0.25 acc. to CIE 1931 (• white)
- Corrosion Robustness Class: 3B
- Qualifications: AEC-Q102 Qualified with RV-level 1
- ESD: 8 kV acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)

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## Ordering Information

Type	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ $\Phi_V$	Ordering Code
KW DMLQ32.SB-6K7L-H5S7-MU-15B5	80 ... 159 lm	Q65112A6616

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## Maximum Ratings

Parameter	Symbol		Values
Operating Temperature	$T_{op}$	min. max.	-40 °C 125 °C
Storage Temperature	$T_{stg}$	min. max.	-40 °C 125 °C
Junction Temperature	$T_j$	max.	150 °C
Forward current $T_s = 25\text{ °C}$	$I_F$	min. max.	10 mA 700 mA
Surge current $t \leq 10\ \mu\text{s}$ ; $D = 0.005$ ; $T_s = 25\text{ °C}$	$I_{FS}$	max.	1000 mA
ESD withstand voltage acc. to ANSI/ESDA/JEDEC JS-001 (HBM, Class 3B)	$V_{ESD}$		8 kV
Reverse current <sup>2)</sup>	$I_R$	max.	200 mA

## Characteristics

$I_F = 350 \text{ mA}$ ;  $T_s = 25 \text{ °C}$

Parameter	Symbol		Values
Chromaticity Coordinate <sup>3)</sup>	$C_x$	typ.	0.27
	$C_y$	typ.	0.25
Peak Wavelength $I_F = 350 \text{ mA}$	$\lambda_{\text{peak}}$	min.	431.0 nm
		typ.	445.0 nm
		max.	456.0 nm
Viewing angle at 50% $I_V$	$2\phi$	typ.	120 °
Forward Voltage <sup>4)</sup> $I_F = 350 \text{ mA}$	$V_F$	min.	2.75 V
		typ.	2.95 V
		max.	3.50 V
Reverse voltage (ESD device)	$V_{\text{RESD}}$	min.	45 V
Reverse voltage <sup>2)</sup> $I_R = 20 \text{ mA}$	$V_R$	max.	1.2 V
Real thermal resistance junction/solderpoint <sup>5)</sup>	$R_{\text{thJS real}}$	typ.	10.0 K / W
		max.	14.0 K / W
Electrical thermal resistance junction/solderpoint <sup>5)</sup> with efficiency $\eta_e = 30 \%$	$R_{\text{thJS elec.}}$	typ.	7.0 K / W
		max.	9.8 K / W

## Brightness Groups

Group	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ min. $\Phi_V$	Luminous Flux <sup>1)</sup> $I_F = 350 \text{ mA}$ max. $\Phi_V$	Luminous Intensity <sup>6)</sup> $I_F = 350 \text{ mA}$ typ. $I_v$
6K	80 lm	90 lm	28 cd
7K	90 lm	100 lm	31 cd
8K	100 lm	112 lm	35 cd
5L	112 lm	125 lm	39 cd
6L	125 lm	140 lm	44 cd
7L	140 lm	159 lm	49 cd

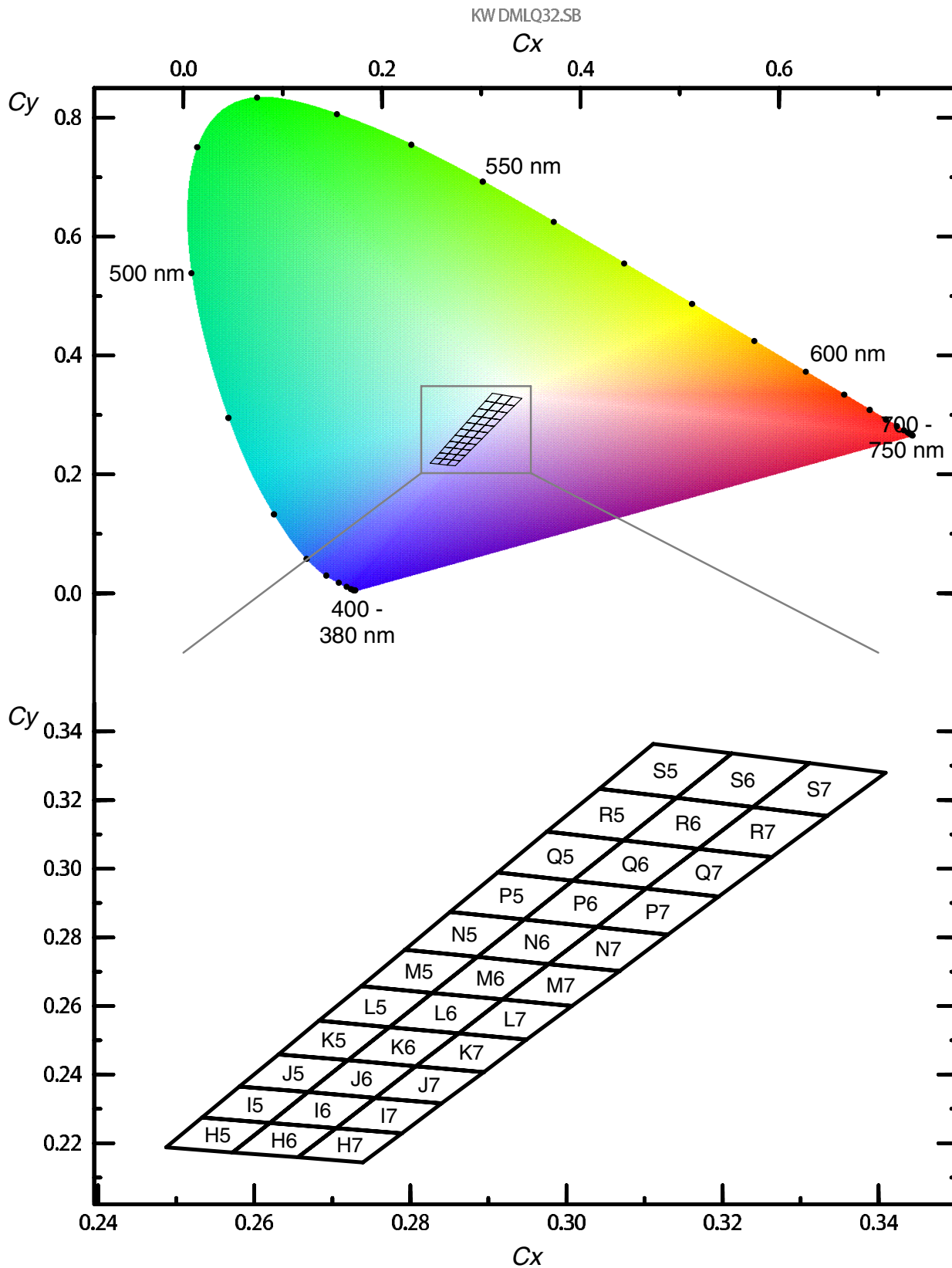
## Forward Voltage Groups

Group	Forward Voltage <sup>4)</sup> $I_F = 350 \text{ mA}$ min. $V_F$	Forward Voltage <sup>4)</sup> $I_F = 350 \text{ mA}$ max. $V_F$
15	2.75 V	3.00 V
65	3.00 V	3.25 V
B5	3.25 V	3.50 V

## Wavelength Groups

Group	Peak Wavelength $I_F = 350 \text{ mA}$ min. $\lambda_{\text{peak}}$	Peak Wavelength $I_F = 350 \text{ mA}$ max. $\lambda_{\text{peak}}$
M	431.0 nm	436.0 nm
N	434.0 nm	439.0 nm
P	436.0 nm	442.0 nm
Q	439.5 nm	444.5 nm
R	442.0 nm	447.0 nm
S	445.0 nm	450.0 nm
T	448.0 nm	453.0 nm
U	451.0 nm	456.0 nm

### Chromaticity Coordinate Groups



### Chromaticity Coordinate Groups <sup>3)</sup>

Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
H5	0.2487	0.2188	J7	0.2755	0.2332	M6	0.2828	0.2638
	0.2572	0.2173		0.2840	0.2316		0.2918	0.2619
	0.2620	0.2259		0.2894	0.2407		0.2977	0.2722
	0.2533	0.2275		0.2807	0.2424		0.2886	0.2743
H6	0.2572	0.2173	K5	0.2631	0.2459	M7	0.2918	0.2619
	0.2656	0.2159		0.2720	0.2442		0.3007	0.2600
	0.2705	0.2244		0.2773	0.2538		0.3068	0.2702
	0.2620	0.2259		0.2683	0.2557		0.2977	0.2722
H7	0.2656	0.2159	K6	0.2720	0.2442	N5	0.2793	0.2764
	0.2739	0.2144		0.2807	0.2424		0.2886	0.2743
	0.2789	0.2229		0.2862	0.2520		0.2946	0.2852
	0.2705	0.2244		0.2773	0.2538		0.2851	0.2874
I5	0.2533	0.2275	K7	0.2807	0.2424	N6	0.2886	0.2743
	0.2620	0.2259		0.2894	0.2407		0.2977	0.2722
	0.2669	0.2349		0.2949	0.2502		0.3039	0.2830
	0.2581	0.2365		0.2862	0.2520		0.2946	0.2852
I6	0.2620	0.2259	L5	0.2683	0.2557	N7	0.2977	0.2722
	0.2705	0.2244		0.2773	0.2538		0.3068	0.2702
	0.2755	0.2332		0.2828	0.2638		0.3130	0.2808
	0.2669	0.2349		0.2737	0.2658		0.3039	0.2830
I7	0.2705	0.2244	L6	0.2773	0.2538	P5	0.2851	0.2874
	0.2789	0.2229		0.2862	0.2520		0.2946	0.2852
	0.2840	0.2316		0.2918	0.2619		0.3008	0.2965
	0.2755	0.2332		0.2828	0.2638		0.2912	0.2989
J5	0.2581	0.2365	L7	0.2862	0.2520	P6	0.2946	0.2852
	0.2669	0.2349		0.2949	0.2502		0.3039	0.2830
	0.2720	0.2442		0.3007	0.2600		0.3102	0.2942
	0.2631	0.2459		0.2918	0.2619		0.3008	0.2965
J6	0.2669	0.2349	M5	0.2737	0.2658	P7	0.3039	0.2830
	0.2755	0.2332		0.2828	0.2638		0.3130	0.2808
	0.2807	0.2424		0.2886	0.2743		0.3195	0.2919
	0.2720	0.2442		0.2793	0.2764		0.3102	0.2942



Group	Cx	Cy	Group	Cx	Cy	Group	Cx	Cy
Q5	0.2912	0.2989	R5	0.2975	0.3108	S5	0.3042	0.3233
	0.3008	0.2965		0.3073	0.3083		0.3141	0.3207
	0.3073	0.3083		0.3141	0.3207		0.3212	0.3336
	0.2975	0.3108		0.3042	0.3233		0.3111	0.3364
Q6	0.3008	0.2965	R6	0.3073	0.3083	S6	0.3141	0.3207
	0.3102	0.2942		0.3169	0.3058		0.3239	0.3180
	0.3169	0.3058		0.3239	0.3180		0.3311	0.3308
	0.3073	0.3083		0.3141	0.3207		0.3212	0.3336
Q7	0.3102	0.2942	R7	0.3169	0.3058	S7	0.3239	0.3180
	0.3195	0.2919		0.3263	0.3034		0.3334	0.3154
	0.3263	0.3034		0.3334	0.3154		0.3409	0.3280
	0.3169	0.3058		0.3239	0.3180		0.3311	0.3308

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## Group Name on Label

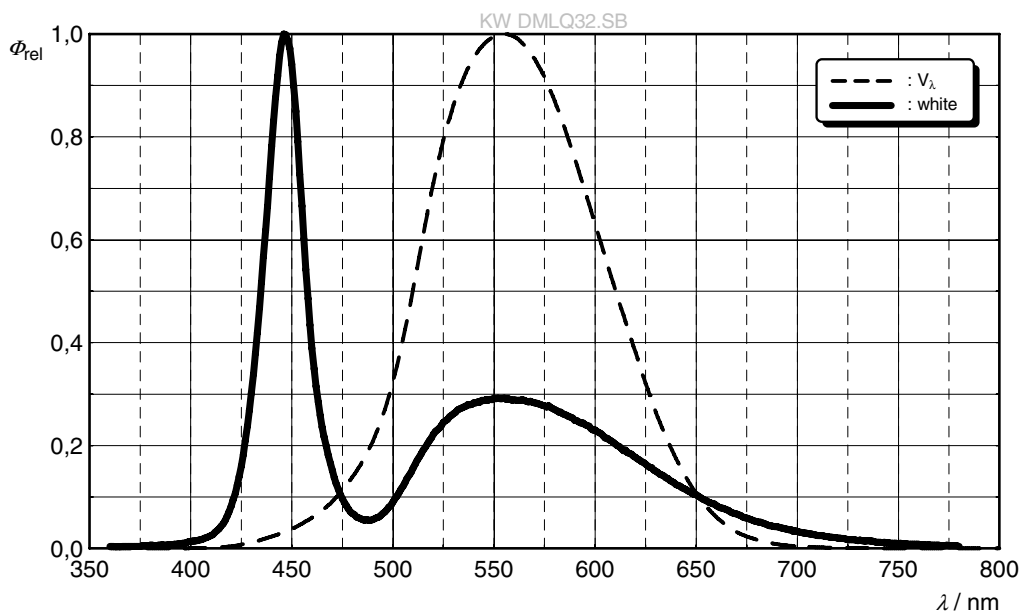
**Example: 5L-H5-M-15**

Brightness	Color Chromaticity	Wavelength Groups	Forward Voltage
5L	H5	M	15

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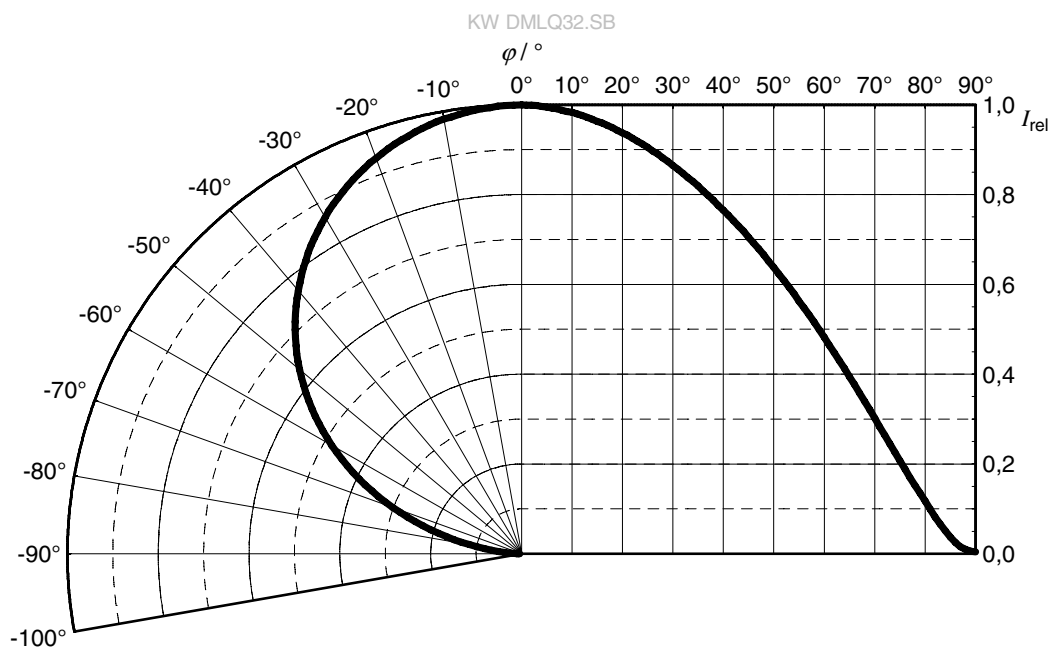
### Relative Spectral Emission <sup>6)</sup>

$\Phi_{rel} = f(\lambda)$ ;  $I_F = 350 \text{ mA}$ ;  $T_S = 25 \text{ }^\circ\text{C}$



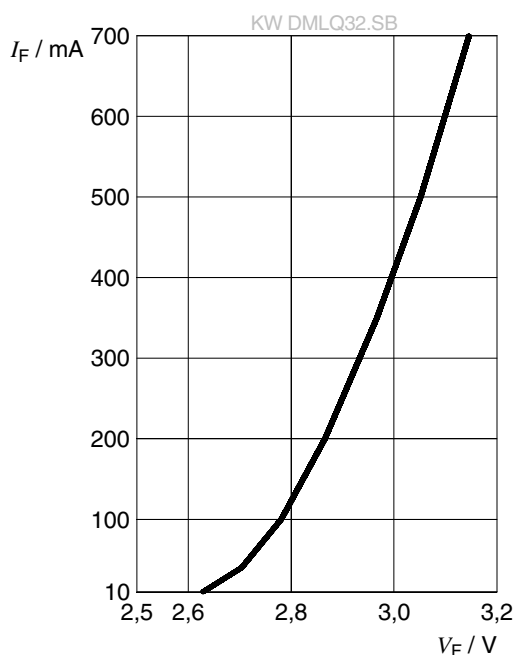
### Radiation Characteristics <sup>6)</sup>

$I_{rel} = f(\phi)$ ;  $T_S = 25 \text{ }^\circ\text{C}$



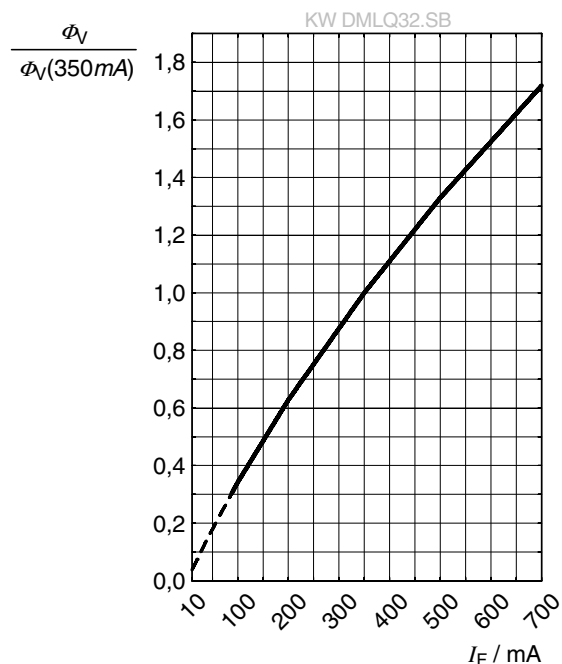
### Forward current <sup>6)</sup>

$$I_F = f(V_F); T_S = 25\text{ °C}$$



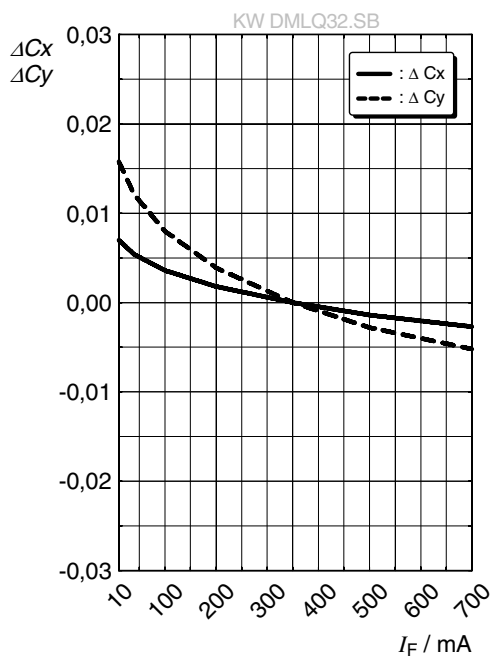
### Relative Luminous Flux <sup>6), 7)</sup>

$$\Phi_V / \Phi_V(350\text{ mA}) = f(I_F); T_S = 25\text{ °C}$$



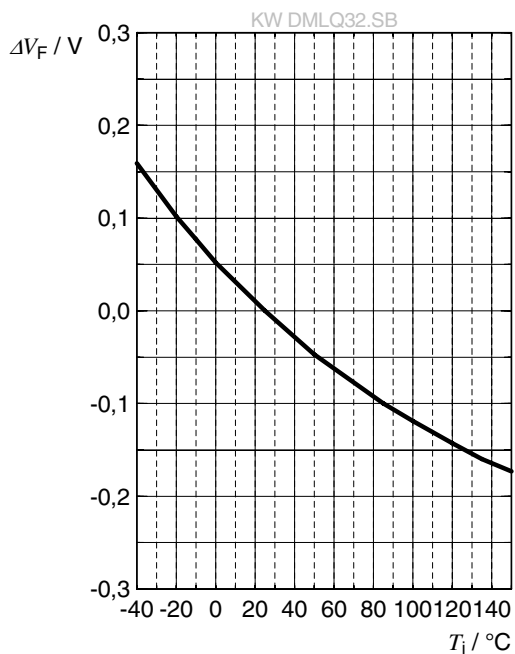
### Chromaticity Coordinate Shift <sup>6)</sup>

$$\Delta C_x, \Delta C_y = f(I_F); T_S = 25\text{ °C}$$



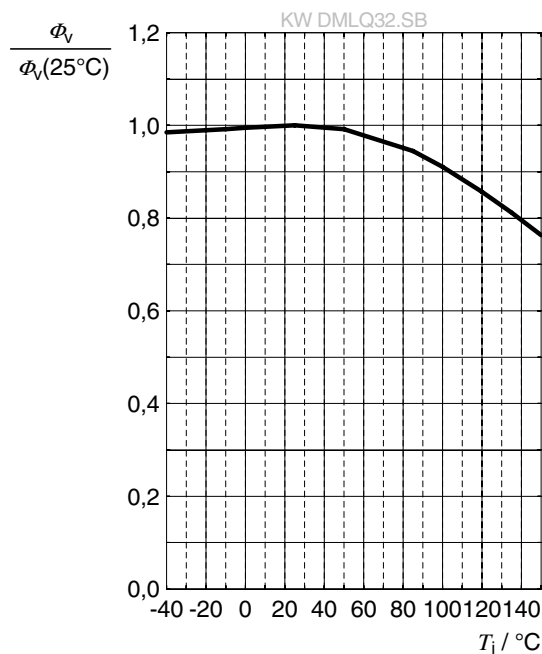
### Forward Voltage <sup>6)</sup>

$$\Delta V_F = V_F - V_F(25\text{ }^\circ\text{C}) = f(T_j); I_F = 350\text{ mA}$$



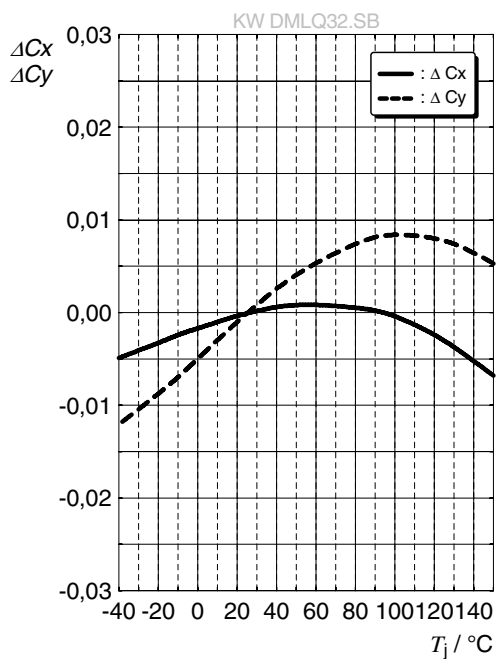
### Relative Luminous Flux <sup>6)</sup>

$$\Phi_v / \Phi_v(25\text{ }^\circ\text{C}) = f(T_j); I_F = 350\text{ mA}$$



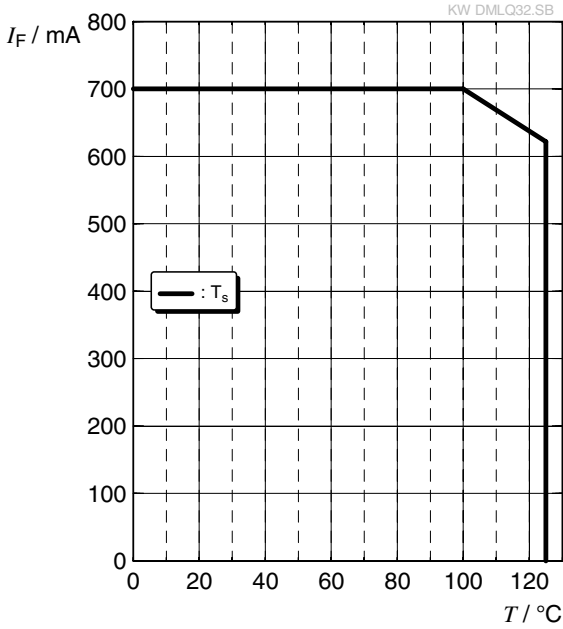
### Chromaticity Coordinate Shift <sup>6)</sup>

$$\Delta C_x, \Delta C_y = f(T_j); I_F = 350\text{ mA}$$



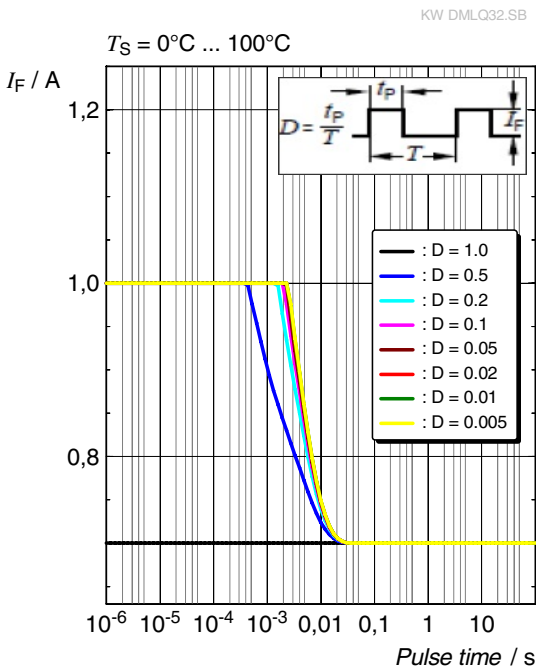
### Max. Permissible Forward Current

$I_F = f(T)$



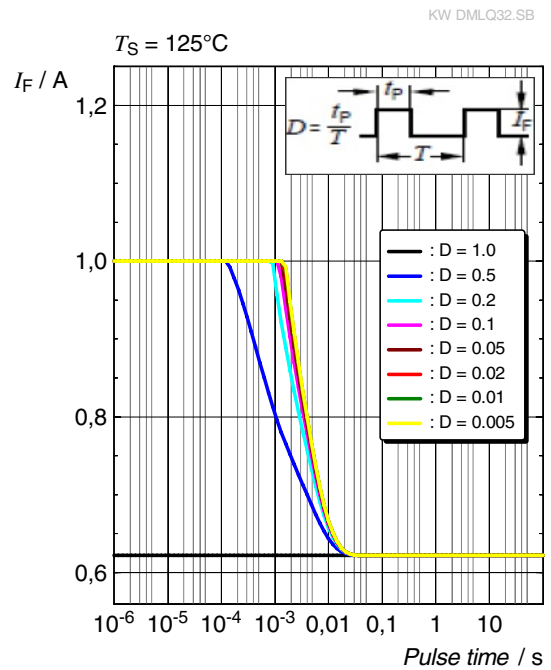
### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle

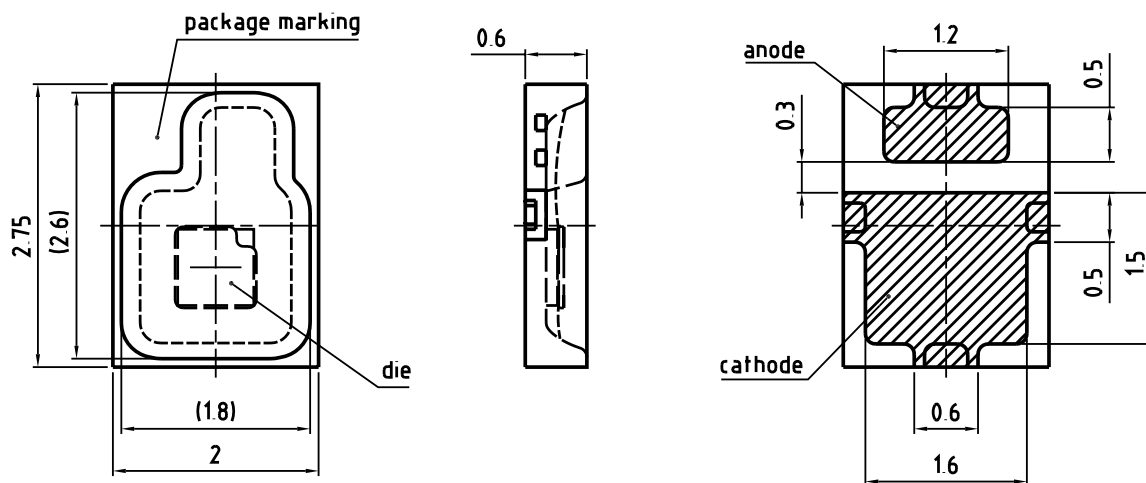


### Permissible Pulse Handling Capability

$I_F = f(t_p)$ ; D: Duty cycle



## Dimensional Drawing <sup>8)</sup>



General tolerance  $\pm 0.1$

Lead finish Au 

C67062-A0116-A6-06

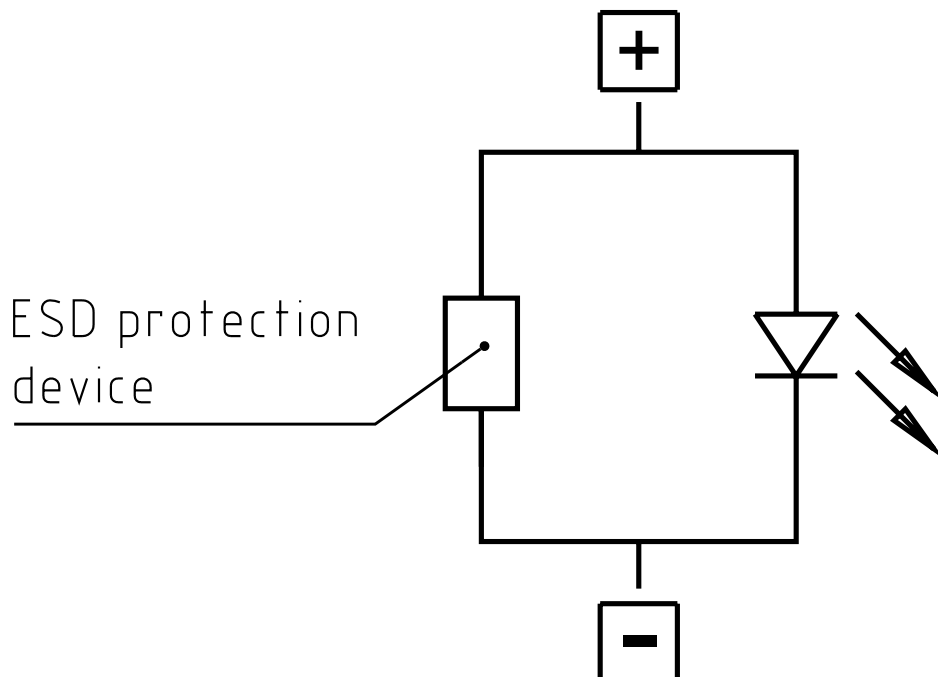
## Further Information:

**Approximate Weight:** 12.0 mg

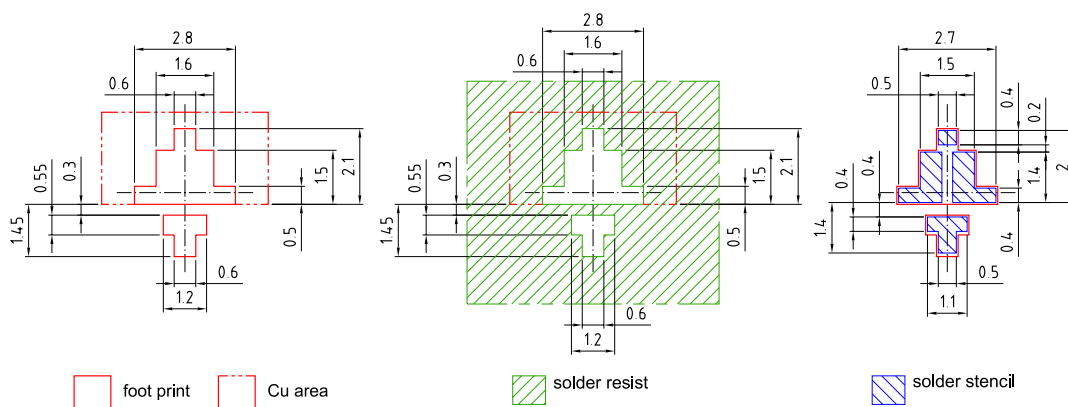
**Corrosion test:** Class: 3B  
Test condition: 40°C / 90 % RH / 15 ppm H<sub>2</sub>S / 14 days (stricter than IEC 60068-2-43)

**ESD advice:** The device is protected by ESD device which is connected in parallel to the Chip.

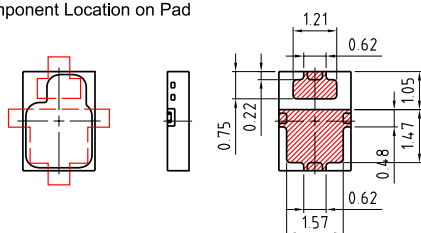
## Electrical Internal Circuit



## Recommended Solder Pad <sup>8)</sup>



Component Location on Pad



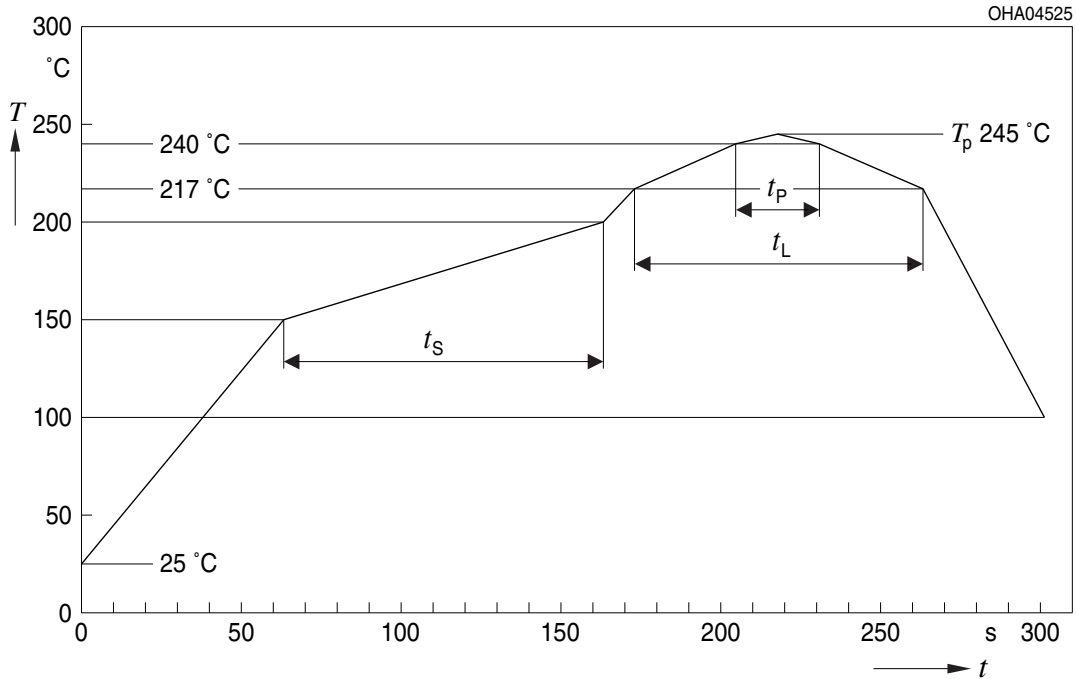
E062.3010.181 -02

For superior solder joint connectivity results we recommend soldering under standard nitrogen atmosphere. Package not suitable for ultra sonic cleaning.



## Reflow Soldering Profile

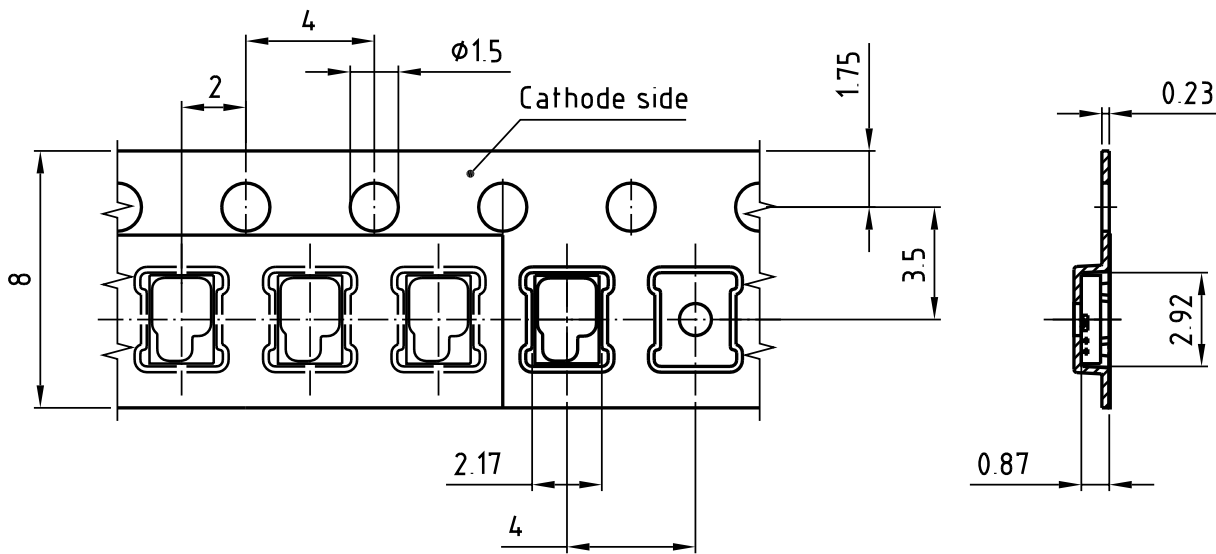
Product complies to MSL Level 2 acc. to JEDEC J-STD-020E



Profile Feature	Symbol	Pb-Free (SnAgCu) Assembly			Unit
		Minimum	Recommendation	Maximum	
Ramp-up rate to preheat <sup>*)</sup> 25 °C to 150 °C			2	3	K/s
Time $t_s$ $T_{Smin}$ to $T_{Smax}$	$t_s$	60	100	120	s
Ramp-up rate to peak <sup>*)</sup> $T_{Smax}$ to $T_p$			2	3	K/s
Liquidus temperature	$T_L$		217		°C
Time above liquidus temperature	$t_L$		80	100	s
Peak temperature	$T_p$		245	260	°C
Time within 5 °C of the specified peak temperature $T_p - 5$ K	$t_p$	10	20	30	s
Ramp-down rate <sup>*</sup> $T_p$ to 100 °C			3	6	K/s
Time 25 °C to $T_p$				480	s

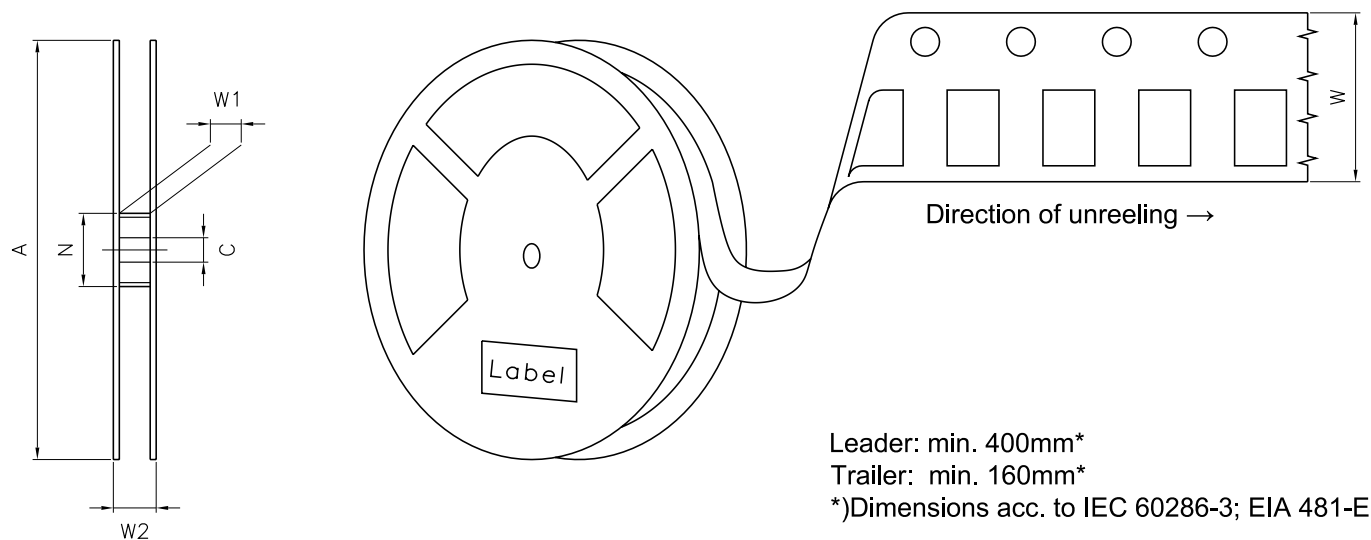
All temperatures refer to the center of the package, measured on the top of the component  
<sup>\*</sup> slope calculation  $DT/Dt$ :  $Dt$  max. 5 s; fulfillment for the whole T-range

Taping <sup>8)</sup>



C67062-A0116-B9-08

## Tape and Reel <sup>9)</sup>



### Reel Dimensions

A	W	N <sub>min</sub>	W <sub>1</sub>	W <sub>2 max</sub>	Pieces per PU
180 mm	8 + 0.3 / - 0.1 mm	60 mm	8.4 + 2 mm	14.4 mm	4000

**Barcode-Product-Label (BPL)**

**OSRAM** LX XXXX    BIN1: XX-XX-X-XXX-X

RoHS Compliant

(6P) BATCH NO: 1234567890 ML Temp    ST  
X    XXX °C X

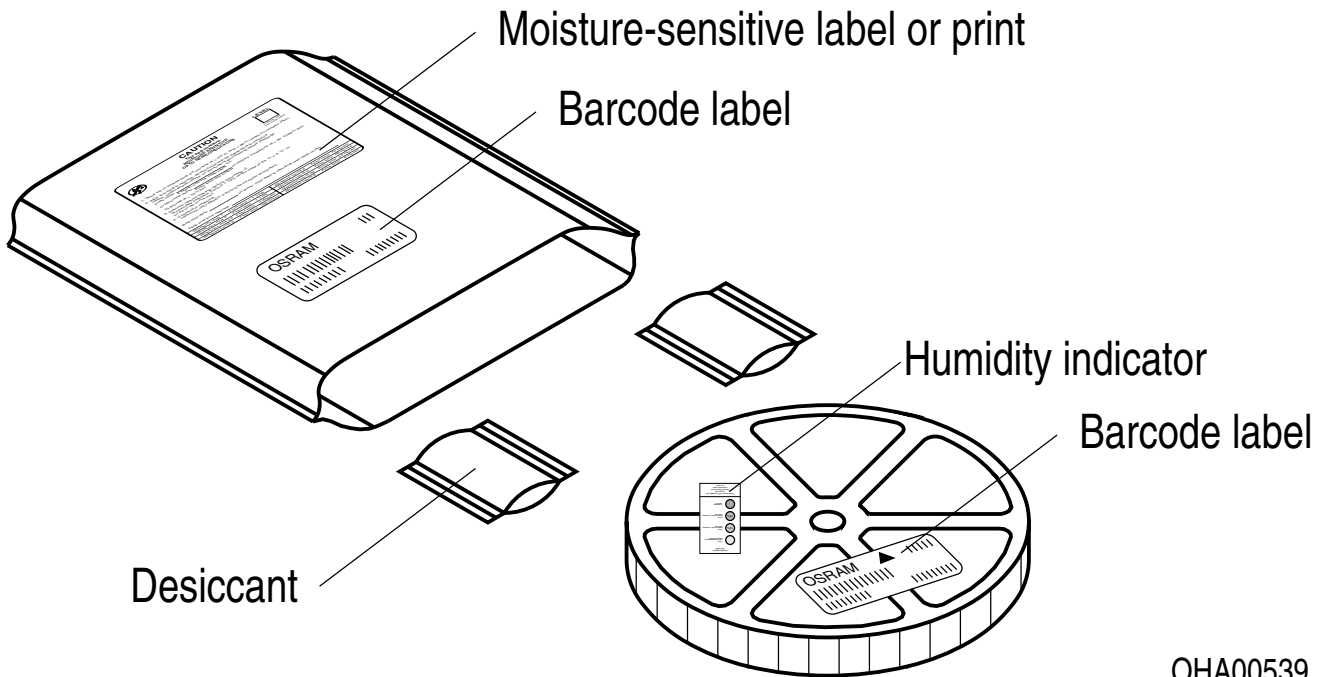
(1T) LOT NO: 1234567890 (9D) D/C: 1234

Pack: RXX  
DEMY    XXX  
X\_X123\_1234.1234 X

(X) PROD NO: 123456789(Q)QTY: 9999 (G) GROUP: XX-XX-X-X

OHA04563

**Dry Packing Process and Materials <sup>8)</sup>**



OHA00539

Moisture-sensitive product is packed in a dry bag containing desiccant and a humidity card according JEDEC-STD-033.

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## Notes

The evaluation of eye safety occurs according to the standard IEC 62471:2006 (photo biological safety of lamps and lamp systems). Within the risk grouping system of this IEC standard, the device specified in this data sheet fall into the class **moderate risk (exposure time 0.25 s)**. Under real circumstances (for exposure time, conditions of the eye pupils, observation distance), it is assumed that no endangerment to the eye exists from these devices. As a matter of principle, however, it should be mentioned that intense light sources have a high secondary exposure potential due to their blinding effect. When looking at bright light sources (e.g. headlights), temporary reduction in visual acuity and afterimages can occur, leading to irritation, annoyance, visual impairment, and even accidents, depending on the situation.

Subcomponents of this device contain, in addition to other substances, metal filled materials including silver. Metal filled materials can be affected by environments that contain traces of aggressive substances. Therefore, we recommend that customers minimize device exposure to aggressive substances during storage, production, and use. Devices that showed visible discoloration when tested using the described tests above did show no performance deviations within failure limits during the stated test duration. Respective failure limits are described in the IEC60810.

For further application related information please visit [www.osram-os.com/appnotes](http://www.osram-os.com/appnotes)

## Disclaimer

### Attention please!

The information describes the type of component and shall not be considered as assured characteristics. Terms of delivery and rights to change design reserved. Due to technical requirements components may contain dangerous substances.

For information on the types in question please contact our Sales Organization.

If printed or downloaded, please find the latest version on our website.

### Packing

Please use the recycling operators known to you. We can also help you – get in touch with your nearest sales office. By agreement we will take packing material back, if it is sorted. You must bear the costs of transport. For packing material that is returned to us unsorted or which we are not obliged to accept, we shall have to invoice you for any costs incurred.

### Product and functional safety devices/applications or medical devices/applications

Our components are not developed, constructed or tested for the application as safety relevant component or for the application in medical devices.

Our products are not qualified at module and system level for such application.

In case buyer – or customer supplied by buyer – considers using our components in product safety devices/ applications or medical devices/applications, buyer and/or customer has to inform our local sales partner immediately and we and buyer and /or customer will analyze and coordinate the customer-specific request between us and buyer and/or customer.

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## Glossary

- 1) **Brightness:** Brightness values are measured during a current pulse of typically 25 ms, with an internal reproducibility of  $\pm 8\%$  and an expanded uncertainty of  $\pm 11\%$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 2) **Reverse Operation:** This product is intended to be operated applying a forward current within the specified range. Applying any continuous reverse bias or forward bias below the voltage range of light emission shall be avoided because it may cause migration which can change the electro-optical characteristics or damage the LED.
- 3) **Chromaticity coordinate groups:** Chromaticity coordinates are measured during a current pulse of typically 25 ms, with an internal reproducibility of  $\pm 0.005$  and an expanded uncertainty of  $\pm 0.01$  (acc. to GUM with a coverage factor of  $k = 3$ ).
- 4) **Forward Voltage:** The forward voltage is measured during a current pulse of typically 8 ms, with an internal reproducibility of  $\pm 0.05$  V and an expanded uncertainty of  $\pm 0.1$  V (acc. to GUM with a coverage factor of  $k = 3$ ).
- 5) **Thermal Resistance:**  $R_{th\ max}$  is based on statistic values ( $6\sigma$ ).
- 6) **Typical Values:** Due to the special conditions of the manufacturing processes of semiconductor devices, the typical data or calculated correlations of technical parameters can only reflect statistical figures. These do not necessarily correspond to the actual parameters of each single product, which could differ from the typical data and calculated correlations or the typical characteristic line. If requested, e.g. because of technical improvements, these typ. data will be changed without any further notice.
- 7) **Characteristic curve:** In the range where the line of the graph is broken, you must expect higher differences between single devices within one packing unit.
- 8) **Tolerance of Measure:** Unless otherwise noted in drawing, tolerances are specified with  $\pm 0.1$  and dimensions are specified in mm.
- 9) **Tape and Reel:** All dimensions and tolerances are specified acc. IEC 60286-3 and specified in mm.

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## Revision History

Version	Date	Change
1.0	2019-11-29	Initial Version
1.1	2021-03-09	Characteristics Wavelength Groups
1.2	2023-03-07	Reel Dimensions New Layout Applications

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EU RoHS and China RoHS compliant product

此产品符合欧盟 RoHS 指令的要求；  
按照中国的相关法规和标准，  
不含有毒有害物质或元素。

**Published by ams-OSRAM AG**

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